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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,030	03/01/2004	Xinye Liu	40004551-0011-002	1253

26263 7590 08/03/2007  
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CHICAGO, IL 60606-1080

EXAMINER
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ZERVIGON, RUDY

ART UNIT	PAPER NUMBER
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1763

MAIL DATE	DELIVERY MODE
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08/03/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/791,030

Applicant(s)

LIU ET AL.

Examiner

Rudy Zervigon

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 30 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 56-70 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 56-70 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. In view of the appeal brief filed on May 3, 2007, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

### ***Drawings***

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "second pressure source" must be shown or the feature canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet,

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A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

  
**PARVIZ HASSANZADEH**  
**SUPERVISORY PATENT EXAMINER**

### *Drawings*

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even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to under 37 CFR 1.83(a) because they fail to show element 113 (specification page 14) as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after

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the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign mentioned in the description: 113. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

5. The drawings are objected to because 403 in the specification page 21 should be element 402 as supported by the figures. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of

the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

6. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o), § 1302.01. Correction of the following is required: See above drawing objections.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 56, 57, and 59-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamilton; Todd A. (US 5993555 A) in view of Sakai; Hiroyuki et al. (US 5070813 A). Hamilton teaches a reaction chamber (112; Figure 4) including a first flow pathway (along 136+128; Figure 4) and first flow limiting conductance (136), second flow pathway (along 132+128; Figure 4) and second flow limiting conductance (132), third flow pathway (along 142+122; Figure 4) and third flow limiting conductance (142), fourth flow pathway (along 144+124; Figure 4) and fourth flow limiting conductance (144). Further, claims 56, 57, 59-70 have

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numerous intended use recitations bracketing Applicant's structural elements generally directed to relative line pressures, relative flow rates, relative "switching"/"selecting" configurations, and "expose period". All of such claim limitations are deemed intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

Hamilton further teaches wherein the gas flow pathway comprises multiple gas flow pathways for purge gasses and chemical precursors which share one or more common inputs to the reactor chamber (112; Figure 4), as claimed by claim 69

Hamilton does not teach:

- i. a second gas flow pathway coupled downstream of the reaction chamber and having switchable second and fourth limiting conductances – claim 56
- ii. An atomic layer deposition (ALD) system, comprising: a gas flow pathway coupled upstream of Hamilton's reactor chamber (112; Figure 4) through selectable Hamilton's upstream flow limiting conductances (132,134,136,142,144; Figure 4) having two or more operational modes including a low flow mode and a high flow mode; and a pumping arrangement coupled downstream of the reactor chamber (112; Figure 4) through selectable downstream flow limiting conductances having two or more



operational modes including a low flow mode and a high flow mode, wherein the Hamilton's upstream flow limiting conductances (132,134,136,142,144; Figure 4) and downstream flow limiting conductances are configured to switch operational modes in time-phase with one another, as claimed by claim 62. Applicant's claim limitations of "An atomic layer deposition (ALD) system:", "having two or more operational modes including a low flow mode and a high flow mode", and "configured to switch operational modes in time-phase with one another" are each claim requirements of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

- iii. The ALD apparatus of claim 62, wherein the Hamilton's upstream flow limiting conductances (132,134,136,142,144; Figure 4) are configured to switch operational modes prior to the downstream flow limiting conductances switching operational modes, as claimed by claim 63
- iv. The ALD apparatus of claim 62, wherein the downstream flow limiting conductances include a throttle valve, as claimed by claim 64

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- v. The ALD apparatus of claim 64, wherein the throttle valve comprises an annular throttle valve located within the reactor chamber (112; Figure 4), as claimed by claim 65.
- vi. The ALD apparatus of claim 65, wherein the annular throttle valve includes multiple vanes, each having an axis therethrough, as claimed by claim 66
- vii. The ALD apparatus of claim 65, wherein the annular throttle valve includes multiple blades arranged in an iris configuration, as claimed by claim 67
- viii. The ALD apparatus of claim 65, wherein the annular throttle valve includes multiple blades, each having a number of holes therethrough, at least one of the blades being rotatable about an axis such that holes extending through the rotatable blade align with holes of at least one of the other blades to provide a passage through the annular throttle valve, as claimed by claim 68
- ix. The ALD apparatus of claim 62, wherein the Hamilton's upstream flow limiting conductances (132,134,136,142,144; Figure 4) and downstream flow limiting conductances are configured to switch operations modes according to a difference in residence times for passage of gas between (i) the upstream conductances and the reaction chamber, and (ii) the reaction chamber and the downstream conductances, as claimed by claim 70

Sakai teaches a wafer treating apparatus (Figure 1) including reaction chamber (1; Figure 1).

Sakai further teaches:

- i. a pumping (8; Figure 1, column 2; lines 45-69) arrangement coupled downstream of the reactor chamber (1; Figure 1, column 2; lines 45-69) through selectable downstream flow limiting conductances (9-11, 13-20; Figure 1, column 2; lines 45-69) having two or more

operational modes including a low flow mode and a high flow mode, wherein the Sakai's upstream flow limiting conductances (132,134,136,142,144; Figure 4) - claim 62. Applicant's claim limitations of "An atomic layer deposition (ALD) system:", "having two or more operational modes including a low flow mode and a high flow mode", and "configured to switch operational modes in time-phase with one another" are each claim requirements of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

- ii. switch operational modes prior to the downstream flow limiting conductances (9-11, 13-20; Figure 1, column 2; lines 45-69) switching operational modes, as claimed by claim 63. Applicant's claim limitations of "are configured to switch operational modes prior" is a claim requirement of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is

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- capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).
- iii. the downstream flow limiting conductances (9-11, 13-20; Figure 1, column 2; lines 45-69) include a throttle valve (9; Figure 1, column 2; lines 45-69,2), as claimed by claim 64
  - iv. the throttle valve (9; Figure 1, column 2; lines 45-69,2) comprises an annular throttle valve (9; Figure 1, column 2; lines 45-69,2) located within the reactor chamber (1; Figure 1, column 2; lines 45-69), as claimed by claim 65.
  - v. the annular throttle valve (9; Figure 1, column 2; lines 45-69,2) includes multiple vanes (10; Figure 2; column 3; lines 1-29), each having an axis therethrough, as claimed by claim 66
  - vi. the annular throttle valve (9; Figure 1, column 2; lines 45-69,2) includes multiple blades (10; Figure 2; column 3; lines 1-29) arranged in an iris configuration, as claimed by claim 67
  - vii. the annular throttle valve (9; Figure 1, column 2; lines 45-69,2) includes multiple blades (10; Figure 2; column 3; lines 1-29), each having a number of holes (a,b; Figure 2; column 3; lines 1-29) therethrough, at least one of the blades (10; Figure 2; column 3; lines 1-29) being rotatable about an axis such that holes (a,b; Figure 2; column 3; lines 1-29) extending through the rotatable blade align with holes (a,b; Figure 2; column 3; lines 1-29) of at least one of the other blades (10; Figure 2; column 3; lines 1-29) to provide a passage through the annular throttle valve (9; Figure 1, column 2; lines 45-69,2), as claimed by claim 68

viii. Sakai's downstream flow limiting conductances (9-11, 13-20; Figure 1, column 2; lines 45-69) is configured to switch operations modes according to a difference in residence times for passage of gas between (i) the upstream conductances and the reaction chamber, and (ii) the reaction chamber and the downstream conductances, as claimed by claim 70. Applicant's claim limitation "configured to switch operations modes according to a difference in residence times for passage of gas between (i) the upstream conductances and the reaction chamber, and (ii) the reaction chamber and the downstream conductances" is a claim limitation of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Sakai's downstream flow limiting conductances (9-11, 13-20; Figure 1, column 2; lines 45-69) and pumping arrangement (8; Figure 1, column 2; lines 45-69) to Hamilton's apparatus. Motivation to add Sakai's downstream flow limiting conductances (9-11, 13-20; Figure 1, column 2; lines 45-69) and pumping arrangement (8; Figure 1, column 2; lines 45-69) to

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Hamilton's apparatus is for accurate exhaust flow control as taught by Sakai (column 1, lines 53-64).

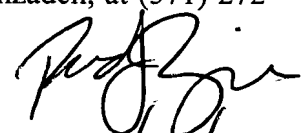
9. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamilton; Todd A. (US 5993555 A) and Sakai; Hiroyuki et al. (US 5070813 A) and further in view of Cox; Gerald M. (US 6228773 B1). Hamilton and Sakai are discussed above. Hamilton and Sakai do not teach a plasma assisted process. Cox teaches a similar processing apparatus arrangement in Figure 14, including external plasma sources 4.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Cox's plasma source to Hamilton's apparatus.

Motivation to add Cox's plasma source to Hamilton's apparatus is for providing "plasma treatment" to wafers as taught by Cox (claim 25).

### *Conclusion*

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

  
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